

REMARKS

Pending Claims

Claims 15-28 have been amended. Claim 29 has been canceled without prejudice or disclaimer and claims 1-14 were canceled by prior amendment. No new claims have been added. Accordingly, claims 15-28 are now pending in the application.

35 U.S.C. §112, First Paragraph

Claims 15, 17, 19, 20, 21, 24 and 28 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention. In response, Applicants respectfully traverse these rejections, and point out below how the limitations in question have been amended or are supported in the specification and drawings of the application.

Claims 15, 17, 19, 20 and 24

The Office Action asserts that the specification fails to teach "*a management logical unit*". In response, the term "management logical unit" has been removed from the claims. Applicants' invention includes a *control-dedicated logical unit* also referred to as a *command device* in Applicants' specification, which is a management

logical unit dedicated for coupling control, and which is distinguished from logical units for reading from and writing to or programmed from and programmed to by a normal host (see, e.g., page 5, line 24-page 6, line 9 of Applicants' specification). The command device is a "control-dedicated logical unit" (see, e.g., page 6, lines 5-6). The amended claims now refer to either a "control-dedicated logical unit" or a "command device". Both of these terms are present and supported in the specification, as pointed to above. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, first paragraph,

Coupling of Logical Units – Claims 15, 16, 21, 24 and 25

The Office Action asserts that Applicants' specification does not support coupling of one logical unit to another logical unit. The Office Action further states at Page 3, lines 2-3, that Applicants' specification "supports *coupling from the command device to the logical unit(s)...*" (emphasis added). The Office Action also states at Page 3, lines 18-20, that "according to the specification, the coupling operations are for *coupling logical units to the command device...*" (emphasis added). However, Applicants would like to point out that these statements in the Office Action are a misinterpretation of Applicants' invention. The coupling operations are NOT for coupling the command device to any of the other logical units. Further, at Page 4, lines 8-9 of the Office Action, it is asserted that "each host

adapter accesses the respective command device in its group, which *allows the command device to access the logical units* within the group..." (emphasis added).

This is also a misinterpretation, since the command device is a logical unit and does not access other logical units. Applicants respectfully note that nowhere in Applicants' specification is there any support for these assertions.

For example, there typically would be no useful purpose served in coupling the command device to any of the other logical units. Instead, as discussed at page 1, lines 11-14 of Applicants' specification:

Such an external storage system in current use has coupling functions and is capable of copying logical units between the present system and another external storage system. These coupling functions include a plurality of coupling operations.

Thus, coupling of logical units might typically be performed for establishing remote replication copying, wherein a replication pair is established by coupling a logical unit in one storage system with a target logical unit in another storage system. However, coupling can also be carried out between two logical units within a storage system to create a local replication pair. Coupling of logical units can be complex because of various issues such as LUN security. However, the use of the command device and the extended logical unit information of the invention overcome these issues. Further, the above quotation shows support for the limitations of claims 16 and 25, i.e., enabling copying of a logical unit.

The claims have been amended to address the Examiner's concerns set forth on pages 2-5 of the Office Action. The basic function of the command device includes that the command devices are shared logical units exclusively used for communication with the host computer (see, e.g., page 1, lines 23-24). The host computer writes the commands into the dedicated command devices as data, whereas the external storage system processes the data written into the command devices as commands (see, e.g., page 1, line 24 - page 2, line 2). Coupling-operation instructions made from the host computer are executed by writing the instructions into the corresponding command device through an operation application or an operation API on the host computer (see, e.g., page 2, lines 2-7). Extended logical unit information collected by the host used to create a list of logical units on which the host computer can perform operations (see, e.g., page 9, lines 11-16 and page 10, lines 22-25). The host can only perform coupling operations on logical units for which extended logical unit information has been obtained (see, e.g., page 9, lines 20-23).

In view of the foregoing clarifications and the amendments to the claims, Applicants respectfully request withdrawal of the rejections of claims 15, 17, 19, 20, 21, 24 and 28 under 35 U.S.C. §112, first paragraph.

35 U.S.C. §112, Second Paragraph

Claims 15, 16, 24 and 28 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention. Applicants have addressed each of the limitations rejected in the Office Action by amending the claims. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. §112, second paragraph.

35 U.S.C. §103(a)

Claims 15-29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over DeKoning, US Pat. No. 6,671,776 (hereafter "DeKoning"), in view of Applicant Admitted Prior Art, US Pat. Appl. Pub. No. US2002/0143903 (hereafter "AAPA"), and further in view of Kedem, US Pat. No. 6,725,331 (hereafter "Kedem"). In response, Applicants respectfully traverse the rejections, and request reconsideration and withdrawal of the rejections for the following reasons.

The Office Action cites DeKoning as teaching

wherein the storage system adds extended logical unit numbers used in coupling to a response sent by the storage system as a reply to an inquiry command received from said host directed to a specified logical unit of said plurality of logical units, each said extended logical unit number including a connection port, a target ID, and a logical unit number,

as recited in Applicants' claim 15 (citing DeKoning at col. 3, lines 1-33, Table in col. 6, and col. 8, lines 46-53). However, Applicants respectfully note that the storage

system of DeKoning does not return extended logical unit numbers to the hosts as defined in Applicants' claims and specification, and does not do so in response to an inquiry command received from the host. Rather, DeKoning only provides a LUN to the hosts corresponding to a volume ID. For example, as illustrated in FIG. 4, Host #1 accesses the volume "Bob" using LUN 8 while Host #2 accesses the volume "Bob" using LUN 0, but each host is already connected to a separate port (FIG. 4 and col. 6, lines 30-34). Further, Host #3 and Host #4 are attached to the storage system using the same controller port, but each has its own LUN address space, i.e., Host #3 is assigned only volume "Kim" at LUN 0 and Host #4 is assigned "Sue" at LUN 1 and "Kim" at LUN 7. Additionally, in the case of Host #2, which has multiple port connections to the storage subsystem, the storage path name is maintained in the storage system, and only the volume and LUN are known to the host, as shown in Table 2 in column 6, which is a table maintained by the storage system (col. 6, lines 45-63 and FIG. 4). Thus, there is no port information included with the LUN information returned by the storage system of DeKoning to the hosts, and accordingly, the storage system of DeKoning does not return extended logical unit information that includes a connection port, as recited in Applicants' claims.

Further, each host in DeKoning has an application resident thereon that provides topology information to the storage array controllers (col. 6, lines 64-65). At initiation of the network, each host performs an identification process with every controller on the network. Each host discovers all the paths it has to access the

controllers that support topological functionality (col. 7, lines 5-7). Each host then sends a command in the form of a fibre channel packet including information about the unique host identifier, cluster data if applicable, and host type. The storage controller keeps a table of this information that can be read out by the management console to dynamically generate the topology of the network (col. 7, lines 7-23). Thus, in DeKoning, the storage system does not add extended logical unit numbers used in coupling to a response sent by the storage system as a reply to an inquiry command received from said host directed to a specified logical unit, as recited in Applicants' claim 15. Instead, in DeKoning, an application on the host sends information regarding the host identifier and host type to the storage system, and the port information is maintained in the storage system. Further, the LUNs of DeKoning do not include connection port information, as also recited in Applicants' claim 15. Instead, the port information is contained in the storage path in the storage system, as illustrated in Table 2 at column 6.

AAPA and Kedem fail to make up for the shortcomings in DeKoning set forth above. AAPA teaches only the use of a command device for directly executing coupling operations from a host computer. Kedem teaches dynamic assignment of resources in a storage system. Accordingly, independent claim 15 is allowable over the combination of DeKoning with AAPA, Kedem and/or the other art of record, whether taken singly, or in combination. Independent claims 20 and 24, as amended, include similar limitations to those discussed above with respect to claim

15, and are allowable under a similar rationale. The remaining claims depend from these claims, and are allowable at least because they depend from an allowable base claim.

Conclusion

Should the Examiner feel that a telephonic or in-person interview would be useful to advance prosecution of the application, the Examiner is encouraged to contact Applicants' undersigned representative.

In view of the foregoing amendments and remarks, Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted



Colin D. Barnitz
Registration No. 35,061

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
1800 Diagonal Rd., Suite 370
Alexandria, Virginia 22314
(703) 684-1120
Date: August 2, 2007